

REMARKS

Claims 1-28 are currently pending. Of these, Claims 9-28 are withdrawn from consideration. However, the withdrawn claims are all ultimately dependent on one of the elected claims. Accordingly, upon allowance of the elected claims, rejoinder of the withdrawn claims is respectfully requested. The following addresses the substance of the Office Action.

Anticipation

Claims 1-6 and 8 were rejected under 35 U.S.C. § 102(b) as being anticipated by Takada et al. (1994 *J Sol-Gel Science and Technology* 1:123-132). However, the presently claimed invention is different from Takada. Unlike Takada, the presently claimed semiconductor superfine particles have a fluorescence quantum yield of 3% or greater. The materials produced by the method of Takada do not satisfy this requirement.

Since nanoparticles have a very high percentage of their atoms (about 50%) on their surfaces, removing surface defects is very important in making the nanoparticles emit light. The technique of coating the surface with a surfactant is useful to produce such light-emitting nanoparticles (see page 9, line 28 to page 10, line 15 of the specification). As disclosed in Takada, however, when nanoparticles are grown in a sol-state glass, surfactant cannot be introduced into the glass, making it impossible to coat the nanoparticles with the surfactant. Unlike in a solution, since glass has a small diffusion coefficient, it is difficult to dispose the nanoparticles on the energetically-stabilized position. This may result in defects.

Takada's method was frequently used in the 1990s. Attempts were made using the method to develop optical communication and optical operation application materials. Because the glass with dispersed nanoparticles advantageously had a large nonlinear optical effect, the light-traveling direction could be controlled at high speeds, up to about a picosecond. The purpose of Takada's method was to yield better nonlinear optical properties in the nanoparticle-dispersed glass obtained. Thus, the glass was used in optical communication and optical operations.

Takada's purpose was to change the light-traveling direction. However, if the material itself emits light, it is difficult to detect the nonlinear optical property. Therefore, the nanoparticle-dispersed glass of Takada does not emit light, and therefore does not meet the claimed limitation of a fluorescence quantum yield of 3% or more.

The present inventors attempted to produce a light-emitting glass using a method similar to Takada's method, i.e., growing nanoparticles in glass, since Takada's method advantageously increases the dispersion concentration of nanoparticles. However, the resulting nanoparticles emitted little light, and had a fluorescence quantum yield of about 1 % or less. The inventors therefore determined that it was impossible, in principle, to make the nanoparticles in the glass emit light. Thus, the present invention, in which light-emitting nanoparticles are prepared and then dispersed in the glass, was developed so that nanoparticles having a fluorescence quantum yield of 3% or more could be achieved.

Since Takada does not satisfy the requirement of "fluorescence quantum yield of 3% or more", the present invention completely differs from Takada, and cannot be anticipated by Takada. Accordingly, the Applicants respectfully request removal of the rejection.

Obviousness

Claim 7 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Takeda et al. (supra) as applied to Claim 1 in further view of Chia et al. (*SPIE* 3136:337-347).

As discussed above, since Takada's nanoparticles are grown in the glass, Takada's nanoparticle-dispersed glass does not have a fluorescence quantum yield of 3% or more. Moreover, in connection with Takada's purpose of changing the light travel direction, it is advantageous for the nanoparticles used by Takada not to emit any light. Thus, the teachings of Takada et al. would direct one having ordinary skill in the art to lower, not raise, the para fluorescence quantum yield. As such, nothing in Takada et al. would suggest a para fluorescence quantum yield of 3% or more, as presently claimed. Moreover, the nanoparticles of Takada can not be treated with a surfactant.

Combining Chia with Takada adds nothing that would suggest the presently claimed invention. In Chia's method, the sol-state glass was first mixed with a starting material of CdTe, and then subjected to the heat-treatment, thereby forming nanoparticles. The Examiner states that this method is similar to that of the present invention. The Examiner apparently believes that the inventions resemble each other simply because they both form dispersed CdTe in the glass. However, the nanoparticles are grown in the glass in Chia's method. Thus, the method of Chia is similar to Takada. Like Takada, because the nanoparticles of Chia are prepared in the

glass, a fluorescence quantum yield of 3% or more cannot be obtained. And for the same reasons discussed above in connection with Takada, the nanoparticles cannot be treated with a surfactant.

In contrast, as recited in Claim 7 of the present invention, the surface of the nanoparticles with a fluorescence quantum yield of 3% or more is retained by adding a surfactant. As a result, an improved fluorescence quantum yield can be attained.

In conclusion, neither Takada nor Chia achieve or even suggest a fluorescence quantum yield of 3% or more. Neither of these references permit the treatment of the nanoparticles with surfactants. Hence, a person skilled in the art would have no way of attaining the invention defined in Claim 7 from a combination of the references. Accordingly, the Applicants respectfully request removal of the rejection under 35 U.S.C. § 103(a).

No Disclaimers or Disavowals

Although the present communication may include alterations to the application or claims, or characterizations of claim scope or referenced art, the Applicants are not conceding in this application that previously pending claims are not patentable over the cited references. Rather, any alterations or characterizations are being made to facilitate expeditious prosecution of this application. The Applicants reserve the right to pursue at a later date any previously pending or other broader or narrower claims that capture any subject matter supported by the present disclosure, including subject matter found to be specifically disclaimed herein or by any prior prosecution. Accordingly, reviewers of this or any parent, child or related prosecution history shall not reasonably infer that the Applicants have made any disclaimers or disavowals of any subject matter supported by the present application.

CONCLUSION

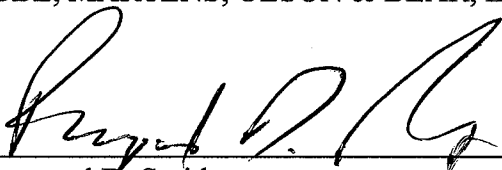
In view of the foregoing Remarks, it is respectfully submitted that the present application is in condition for allowance. Should the Examiner have any remaining concerns which might prevent the prompt allowance of the application, the Examiner is respectfully invited to contact the undersigned at the telephone number appearing below.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

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Dated: 28 July 2008

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